The 2013 Southeast Alaska pink salmon forecast
from the Southeast Coastal Monitoring (SECM) research project

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Researchers from the Auke Bay Laboratories (ABL) of the Alaska Fisheries Science Center (AFSC) have provided forecasting information to stakeholders of the pink salmon resource of Southeast Alaska (SEAK) since 2004. This forecasting information is derived from an ongoing time series of biophysical data collected by the Southeast Coastal Monitoring (SECM) project. Initiated in 1997, the SECM project primarily samples eight stations in the vicinity of Icy Strait. Annual research includes monthly oceanographic sampling in May, June, July, and August, with surface trawling for juvenile salmon in the latter three months. The SECM pink salmon forecasts have allowed stakeholders to anticipate the harvest with more certainty than previous forecasting methods. For example, in eight of the past nine years, these SECM forecast estimates have only deviated from the actual harvests by an average of 7%. Data from juvenile pink salmon catches are also shared with the Alaska Department of Fish and Game (ADFG) to help refine their SEAK pink salmon harvest forecast developed by a different method.

SECM forecast models	Adj. R^2	AICc	Regression *P* value	Prediction for 2013
(1-parameter) Peak CPUE	84.8%	98.1	< 0.001	47.8 M (41.5-51.8)
(2-parameter) Peak CPUE + $ISTI_{20m\ temp}$	91.2%	92.0	< 0.001	**53.8 M (46.2-58.4)**

The table above indicates the two best SECM forecast models for the 2013 SEAK pink salmon harvest, with 80% bootstrap confidence intervals shown in parentheses. The 2-parameter model is the best fit predictor for the relationship of the 16-year time series of SECM data parameters with subsequent SEAK pink salmon harvests from 1998 to 2012, based on the R^2 and AIC_c.

Additional evidence from SECM research and other biological or ecosystem indicators suggests a ***very good pink salmon harvest in SEAK of 53.8 M fish in 2013*** (see ecosystem metrics matrix on back of page). The strongest indicator for this favorable forecast is the 2012 peak juvenile pink salmon CPUE, which was the 4th highest on record. Other ecosystem indicators in 2012 that were significantly correlated ($P < 0.05$) with SEAK pink salmon harvest (1998-2012) were: 1) a favorable July month of peak seaward migration; 2) a high North Pacific Index (NPI = 16.7); and 3) a high average percentage of pink salmon (40%) caught among juveniles in June-July trawl hauls. Less favorable ecosystem indicators were a below average ADFG escapement index for the pink salmon parent year (2011) in SEAK and a below average wild fry production in Auke Creek (2012). An additional indicator favoring a good harvest in 2013 was the ocean catch rates of juvenile pink salmon from a research survey downstream from the SECM project, the Gulf of Alaska Integrated Research Project conducted offshore of Baranof and Chichagof Islands both west and south of Icy Strait. Compared to the SECM surveys, pink salmon catch data from this project may better represent southern and coastal SEAK pink salmon stocks, and higher juvenile pink catches in 2012 than in 2011 suggest a higher harvest of these stocks in 2013 than in 2012.

Ecosystem metrics considered over the SECM time series for forecasting the 2013 pink salmon harvest in Southeast Alaska

"Top" (1st Quartile)	"Upper Middle" (2nd Quartile)	"Lower Middle" (3rd Quartile)	"Bottom" (4th Quartile)

Brood year (BY) +2		BY +1					BY	BY +1	BY +1
Adult pink salmon return year	SE pink harvest (response variable)	Ocean entry year	Juvenile peak pink CPUE June or July	Peak seaward migration month	North Pacific Index (June, July, Aug)	% pink in trawl hauls average June-July	Adult pink ADF&G escapement index for SEAK	Auke Creek fry outmigration (1,000s) Lat 58° N	Upper 1-20 m avg. Icy Strait temp. "ISTI" May-Aug
Data	--->	$SECM_{year}$	NOAA	NOAA	CGD	NOAA	ADFG	NOAA	NOAA
1998	42.5	1997	2.5	July	15.6	12%	18.1	31.1	9.5
1999	77.8	1998	5.6	June	18.1	57%	14.8	60.8	9.6
2000	20.2	1999	1.6	July	15.8	8%	14.3	53.5	9.0
2001	67.0	2000	3.7	July	16.9	18%	27.3	132.1	9.0
2002	45.3	2001	2.9	July	16.8	19%	10.8	61.5	9.4
2003	52.5	2002	2.8	July	15.6	14%	18.6	150.1	8.6
2004	45.3	2003	3.1	July	16.1	24%	16.6	95.1	9.8
2005	59.1	2004	3.9	June	15.1	29%	20.0	169.6	9.7
2006	11.6	2005	2.0	Aug	15.5	19%	15.7	87.9	10.3
2007	44.8	2006	2.6	June	17.0	30%	19.9	65.9	8.9
2008	15.9	2007	1.2	Aug	15.7	9%	10.2	81.9	9.3
2009	38.0	2008	2.5	Aug	16.1	14%	17.6	117.6	8.3
2010	23.4	2009	2.1	Aug	15.1	22%	9.5	34.8	9.6
2011	58.5	2010	3.7	June	17.6	66%	12.7	121.6	9.6
2012	20.7	2011	1.4	Aug	15.7	21%	11.2	30.9	8.9
Pearson correlation "*r*"			0.93	-0.78	0.65	0.59	0.52	0.46	-0.06
P-value (*= significant @ <0.05)			0.00*	0.00*	0.01*	0.02*	0.05*	0.09	0.84
2013	53.8 ?	2012	3.2	July	16.7	40%	14.3	61.8	8.7

Data sources: NOAA (SECM/Auke Creek-J. Joyce), Climate & Global Dynamics (J. Hurrell, http://www.cgd.ucar.edu/cas/jhurrell/indices.data.html), & ADFG (A. Piston)

The matrix above shows selected ecosystem metrics associated with SEAK adult pink harvest over the 16-year SECM time series. The column range values for each metric were ranked and color-coded by quartile: best 4 (green), upper middle 4 (blue), lower middle 4 (orange), and worst 4 (red). Metrics to the right of the response variable column for SEAK pink harvest are ordered by declining correlation and significance (increasing "*P*-value" = declining significance); the corresponding correlation coefficient "*r*" and "*P*-value" are shown below each metric. Note that in addition to CPUE, four other variables are significantly correlated with harvest (Peak migration month, NPI, %pink in June-July trawl hauls, and the ADFG Escapement Index) and suggest an intermediate pink harvest in 2013. Additionally, this matrix shows that anomalously low (red: 2000, 2006, 2008, 2012) or high (green: 1999, 2001, 2005, 2011) return years always flag 3-5 ecosystem indicators of the respective color signal in each row. For the 2013 forecast, however, no "red" ecosystem indicators were flagged. The Icy Strait temperature index "ISTI" shown in the last column is not significantly correlated with harvest, but is an important secondary parameter to explain the error in the CPUE and harvest regression model. For more details about the SECM pink salmon forecasts, please see:
http://www.afsc.noaa.gov/ABL/MSI/msi_sae_psf.htm

If this research is of value to you, we encourage you to contact these NOAA research managers:

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